



# Department of Pesticide Regulation



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## MEMORANDUM

Arnold Schwarzenegger  
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TO: Danny McClure  
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SUBJECT: REVIEW FOR PERMETHIN WATER QUALITY CRITERIA DERIVATION

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The permethrin water quality criteria were derived by applying a new methodology developed by the University of California, Davis (TenBrook *et al.* 2009). Explicitly following the data evaluation criteria of the methodology, the author(s) identified 14 acute and 3 chronic toxicity studies that were reliable and relevant for permethrin criteria derivation from approximately 155 original studies. As acute toxicity data were acceptable from five taxa (i.e., a warm water fish, a cold water fish, a planktonic crustacean, a benthic crustacean, and an insect), a species sensitivity distribution procedure was applied to derive the acute water quality criterion and yielded a recommended criterion of 10 ng/L. The acute criterion is identical to the value calculated by the US EPA method. The chronic criterion was calculated by using the acute-to-chronic ratio (ACR) method that yielded a chronic value of 2 ng/L. Analyses on the existing toxicity data from sensitive species, threatened and endangered species, and ecosystem studies suggested that the derived acute and chronic criteria be protective of aquatic organisms under the current knowledge of permethrin toxicity.

The authors appropriately addressed the limitations and uncertainties involved in the criteria derivation. Because of the high hydrophobicity of pyrethroids that could lead to significant chemical loss in dissolved phase during toxicity tests, it is more appropriate to derive the criteria with toxicity data that are calculated by using measured concentrations from flow-through tests. However, only two flow-through tests and two measured toxicity tests in the data sets are available for the acute criterion derivation. This limitation could lead to an underestimated criterion. For the chronic criterion, the limitations and uncertainties are primarily attributed to the limited number of data sets (only three reliable and relevant data available), lack of paired data to calculate a multi-species ACR (only one pair available thus two default ACR values were used), and absence of the chronic toxicity data on the most sensitive species, *Hyaella azteca*. Other uncertainties are related to toxicity increases with lower temperatures and addition of PBO in pyrethroid formulations. Nevertheless, those limitations and uncertainties could not be corrected or quantified unless additional data are available in the future.

